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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/056,925	01/24/2002	Masateru Tadakuma	FURUK.003AUS	4007

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EXAMINER	
SONG, SARAH U	

ART UNIT	PAPER NUMBER
2874	

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/056,925	TADAKUMA ET AL.	
	Examiner	Art Unit	
	Sarah Song	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 August 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's communication filed on August 19, 2004 has been carefully considered and placed of record in the file. Claims 1-38 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1-12, 14-27 and 29-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tadakuma et al. (*A 104GHz 328fs soliton pulse train generation through a comb-like dispersion profiled fiber using short high nonlinearity dispersion fibers*, previously relied upon) in view of Yatsu et al. (*High-quality sub-100-fs optical pulse generation by fiber-optic soliton compression of gain-switched distributed-feedback laser-diode pulses in conjunction with nonlinear optical fiber loops*, previously relied upon).** Tadakuma et al. discloses a comb-like dispersion profiled fiber (CDPF) having three or more portions wherein adjacent portions of said three or more portions have different dispersive characteristics (see Figure 1). Tadakuma et al. also discloses that the resultant pulses from the CDPF had a pedestal (see Results). Tadakuma et al. does not disclose the CDPF to be formed into an optical loop mirror.

4. Yatsu et al. discloses an optical fiber having end portions coupled (by means of 50/50 coupler having four ports) so as to form an optical loop mirror (see Figure 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to couple

the ends of the CDPF of Tadakuma et al. so as to form an optical loop mirror in order to suppress pedestals of the pulses as taught by Yatsu et al. (see page 1172, 2nd paragraph).

5. Resultantly, an optical input pulse input into the input port of the optical loop mirror would be split into two lesser magnitude optical pulses, which are counter-propagating (i.e. propagate in opposite directions through said fiber optic loop). The output port would also be resultantly optically connected to each of said ends of the fiber optical loop so as to receive energy from both of said counter-propagating pulses. Furthermore, the propagating pulses would be compressed and phase-shifted with respect to each other so as to optically interfere with each other to prevent noise (pedestals) associated with said optical pulses from being output from said output port.

6. Regarding claim 2, the CDPF sections increase in length from one end to the other end, as shown in Figure 1.

7. Regarding claim 3, Table 2 discloses sections having a length between about 0.3 and about 200 meters.

8. Regarding claims 4-6 and 16, Tadakuma et al. discloses an embodiment comprising 5 pairs, or 10 sections, delimited by changes in dispersion (top of page 179).

9. Regarding claims 7 and 17, it is evident from the disclosed structure of the CDPF that an optical signal propagating therethrough is repeatedly compressed.

10. Regarding claims 8, 20, 25 and 30, Tadakuma et al. does not specifically disclose an optical amplifier located within the CDPF or disposed to amplify light prior to coupling into the coupler. Optical loop mirrors comprising amplifiers are well known in the art for amplifying an optical signal propagating therein. It would have been obvious to one having ordinary skill in

the art at the time the invention was made to provide an amplifier within the CDPF or prior to the coupler in order to compensate for a decrease in pulse energy.

11. Regarding claims 9 and 21, a further chirp compensation fiber is not specifically disclosed. An additional chirp compensation fiber would have been obvious to one having ordinary skill in the art at the time the invention was made in order to compensate for residual chirp of the generated optical pulse.

12. Regarding claims 10, 11 and 12, polarization controllers or polarization maintaining fibers are not specifically disclosed. Polarization controllers within or upstream from a fiber optic loop are well known in the art for the purpose of minimizing natural birefringence in the system. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a polarization controller within the fiber optic loop to minimize the natural birefringence in the fiber optic loop. Furthermore, a polarization maintaining fiber would have been obvious since it was known in the art that a polarization maintaining fiber would have been functionally equivalent to a fiber comprising a polarization controller.

13. Regarding claims 18 and 19, note Figure 5 of Tadakuma et al.

14. Regarding claims 23, 24 and 37, Tadakuma et al. also discloses a pulsed light source coupled to the CDPF comprising a plurality of optical sources having different wavelengths that are combined to produce a modulated light beam (see top of page 179 and Figure 2). Therefore, the method comprising the steps of optically coupling the end portions of the fiber and coupling a pulsed light source would also have been obvious as setting forth requisite steps for providing the device as discussed above.

15. Regarding claim 26, an isolator is not specifically disclosed. An isolator would have been obvious to one having ordinary skill in the art at the time the invention was made to prevent unintentional feedback to the light sources.

16. Regarding claim 27, note Figure 2 of Tadakuma et al.

17. Regarding claims 31-36, the method steps are also obvious as setting forth requisite steps for operation and manufacture of the device as discussed above.

18. **Claims 13 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tadakuma et al. in view of Yatsu et al. as applied to claim 1 or 13 as applicable above, and further in view of Chernikov et al. (*Comblike dispersion-profiled fiber for soliton pulse train generation*, previously relied upon).** Tadakuma et al. and Yatsu et al. do not specifically disclose a CDPF optically coupled to said input of said optical mirror such that optical pulses are compressed prior to input into said optical mirror. Chernikov et al. discloses CDPF coupled after an optical source for compressing optical pulses. One of ordinary skill in the art would have found it obvious at the time the invention was made to provide the CDPF coupled between the optical source and the optical mirror to provide precompressed pulses to the optical mirror. One of ordinary skill in the art would have been motivated to provide a CDPF prior to input of the optical mirror to enhance the pulse compression and shaping achieved by the device.

Response to Arguments

19. Applicant's arguments filed August 19, 2004 have been fully considered but they are not persuasive. Applicant states that one of ordinary skill in the art would have lacked the motivation to combine the references above, especially since there would be no reasonable expectation for success based on what was disclosed by the references. Examiner respectfully disagrees.

20. As stated by the Applicant, Tadakuma et al. is directed to a pulse generation circuit that produces a 328fs soliton pulse train using a comb-like dispersion profiled fiber. Tadakuma et al. does not disclose an optical loop.

21. Also as stated by Applicant, Yatsu et al. recognize that NOLMs work successfully to suppress noise in soliton pulses in the range of 250-500fs.

22. Therefore, one of ordinary skill in the art would have been motivated to combine the references since Yatsu et al. clearly discloses the advantage of NOLMs for suppressing noise in soliton pulses.

23. Furthermore, since Yatsu et al. recognizes the success of NOLMs for soliton pulses in the range of 250-500fs, there is a reasonable expectation for success to modify the disclosure of Tadakuma et al. to comprise a NOLM given that the CDPF of Tadakuma et al. produces pulses within the disclosed range for successful suppression of noise using a NOLM as taught by Yatsu et al.

24. In response to applicant's argument that Yatsu et al. and Tadakuma et al. have differing objectives, or that the combination would render Yatsu et al. unfit for it's intended purpose, it is noted that Yatsu et al. is relied upon as a secondary reference as disclosing the general teaching of NOLMs for noise suppression, and more specifically of noise suppression in soliton pulses in the range of 250-500fs. Therefore, although the two devices of Tadakuma et al. and Yatsu et al. are designed to operate on different pulse widths, the teaching to modify the disclosure of Tadakuma et al. is clearly present in the disclosure of Yatsu et al. as noted in the rejection above. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must

be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

25. Therefore, as stated above, the references clearly suggest to one having ordinary skill in the art the desirability of a NOLM for noise suppression of the soliton pulses since Yatsu et al. clearly discloses the known success in the art of NOLM for noise suppression in soliton pulses in the range of 250-500fs. As such, the combination of Tadakuma et al. in view of Yatsu et al. Is not based on unreasonably and improper hindsight reasoning.

26. Therefore, the rejection of claims 1-38 are maintained as being obvious of Tadakuma et al. in view of Yatsu et al., and as applicable, further in view of Chernikov et al.

Conclusion

27. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah Song whose telephone number is 571-272-2359. The examiner can normally be reached on M-Th 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 571-272-2344. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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